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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/649,577
Filing Date: August 26, 2003
Appellant(s): HAWKS ET AL.

Farshad Farjami
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed February 07, 2008 and supplement appeal brief filed March 04, 2008 appealing from the Office action mailed October 05, 2007.

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(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,001,671	FJELSTAD	12-1999
4,944,087	LANDI	7-1990
5,218,759	JUSKEY ET AL.	6-1993
6,111,199	WYLAND ET AL.	8-2000

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5,972,234	WENG ET AL.	10-1999
4,530,152	ROCHE ET AL.	7-1985

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

1. Claims 1-2,5-6,16,20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,001,671) taken with Landi (4,944,087) and Juskey et al (5,218,759).

Re claim 1, Fjelstad '671 teaches (at Figs 2A-2E,2F, col 5, lines 26-65; Figs 1A-1G-1, 1D-3; col 1-5; col 3, line 53 through col 5) a method for forming a package for an electronic device, the method comprising the steps of attaching a removable material of polymer sheet (100' in Figs 2A, col 5, lines 26-65; 100 in Fig 1) to a surface of a conductive material (101' in Fig 2A; cols 5, lines 26-65; 101 in Fig 1), wherein the removable material of polymer material, polyimide, polyetherimide, fluropolymer (col 3, lines 61-62) are soluble, and can be dissolved in a specific etching solution (col 5, lines 60-65); forming isolated conductive features (110' in Figs 2B,2F; 110 in Figs 1B,1D-3) within said conductive material; forming a die attach pad 115' within the conductive material (Fig 2B, col 5, lines 26-65); coupling the electronic device 120' to the die attach pad 115' (Figs 2B-2E); attaching an encapsulant (140' in Fig 2D; 140 in Fig 1E) to the isolated conductive features (110' in Figs 2B,2F; 110 in Figs 1B,1D-3), the die attach pad 115', the electronic device 120', and the removable material 100' of polymer material (Figs 2D-2E); and removing the removable material from the conductive features 110',115',110 and the encapsulant (Fig 2F, col 5, lines 60-65; Fig 2E, col 5, lines 45-65; Figs 1E-1F; col 4, line 66 through col 5), wherein the entire polymer sheet 100' of the removable material may simply be removed by chemically dissolving the sheet leaving the pads 110' and the central conductive region 115' exposed so as to provide a package of an electronic device 120' as similarly shown

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in Figures 4A, 4B, 3, and 1E-1G-1. Re claim 2, wherein the step of forming isolated conductive pad features includes patterning and selectively etching of a metal deposit layer using photolithographic technique (col 5, lines 26-40; Figs 2A-2B), which photolithographic techniques is obviously and inherently performed by patterning a surface of the conductive material with a material resistant to an etchant and etching the conductive material with the etchant, wherein a die attach pad 115' is formed within said conductive material (Figs 2A-2C), wherein the device 120' is coupled to said die attach pad 115' (Figs 2C). Re claim 5, wherein an input/output portion of the device 120' is electrically coupled to said isolated conductive feature 110' (Figs 2C,2F,1D-3). Re claim 6, wherein the method further comprises the step of singulating individual packaged devices (Figs 1F,1G-2; col 5, lines 10-65). Re claim 16, wherein the removable material 100',100 is used and acted as a molding stencil during molding of encapsulant 140',140 (Fig 1E;2D; col 4, lines 56-65; col 5, lines 26-65). Re claim 20, wherein the conductive material 101',101 of metal deposit comprises a metal frame sheet (Figs 2A-2F,1D-1F). Re claim 21, wherein the conductive material of metal deposit film comprises and acts as a metal leadframe (Figs 2A-2F,1A-1F, Figs 1D-3). Re claim 22, wherein die attach pad 115' is not offset from the isolated conductive features 110' (Figs 2B-2C;2F;1D-3). Re claim 23, wherein a single row of connectors 110',110 is formed around perimeter of the leadframe (Figs 2F,2B,1D-2). Re claim 24, wherein the metal frame comprise a metal sheet by metal deposition (Fig 2A; col 5, lines 26-45). Re claim 25, wherein multiple rows of connectors 110,110' are formed around a peripheral of the metal sheet (Figs 1D-3, 2B,2F; col 4, lines 1-31). Re claim 26, wherein the removable material 100,100' covers substantially the entire bottom surface of the metal lead frame (Figs 2A-2F,1C-1E). Re claim 27, wherein the electronic device 120' is coupled to the die attach pad 115' via a conductive epoxy (Fig2C,1C; col 5, lines 35-45; col 4, lines 32-45).

Fjelstad already discloses (at col 5, lines 60-65,27-65; Figs 2A-2E) removing the removable sacrificial material 100' of polymer sheet attached to a layer of conductive copper material 101', wherein the entire polymer removable sacrificial sheet 100' can be removed by chemically dissolving the removable material of polymer sheet which is soluble.

Fjelstad thus lacks mentioning the removable material comprising an soluble adhesive.

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However, Landi teaches (at Figs 5, step 1; col 5, lines 1-35; col 6 lines 14-50; col 2, lines 6-65; Figs 1-4; col 4, line 7-54) employing a removable material comprising a soluble adhesive in order to easily laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material, wherein the removable material 16 comprises a polyimide material and a soluble adhesive (col 5, lines 12-35; col 6, lines 14-50; col 7, lines 38-51), wherein the removable material comprising the soluble adhesive is removed by dissolving the adhesive with a solvent after molding to encapsulate the circuit pattern with an encapsulant. Juskey et al also teach (at Figs 1-3; col 2, lines 25 through col 3, line 59) employing a removable material 18 comprising a soluble adhesive 19 as a temporary support removable material for bonding and attaching to an electronic device 10; forming an encapsulant 30 thereon (Figs 2-3, col 3, lines 1-20), and thereafter removing the removable material from the feature either by peeling (col 3, lines 20+) or by dissolving or degrading the adhesive bonding with chemical materials that should not cause degradation of the molding compound (col 3, lines 40-46).

Therefore, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the removable material layer 100' to the film of conductive material 101' of Fjelstad by employing a removable material comprising a soluble adhesive for attaching to the conductive material, as taught by Landi and Juskey. This is because of the desirability to surely adhere the removable material to the conductive material, and to improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material. This is also because of art recognized alternative and equivalent for substitution with the desirability to simplify and easily facilitate the removal of the removable material comprising the soluble adhesive from the encapsulated device by simply dissolving the adhesive in a solvent.

2. Claims 7-8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,001,671), Landi (4,944,087), Juskey et al (5,218,759), as applied to claims 1-2, 5-6, 16, 20-27 above, and further of Wyland (6,111,199) and Weng et al (5,972,234).

Fjelstad '671, Landi and Juskey teach a method for forming a package for an electrical device as described to claims 1-2, 5-6, 16, 20-27 above, and repeated herein. Re further claim 17, Fjelstad '671 also teaches (at col 5, lines 60-65, 26-65; col 7, lines 12-16;) the removable

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material comprising a polyimide polymer that can be soluble and dissolved in a specific etching solution (col 5, lines 60-65). Landi also teaches (at col 5, lines 15-35, col 6, lines 21-50) the removable material comprising a polyimide and a soluble adhesive.

The references including Fjelstad and Landi already teach using and removing the removable material comprising the soluble adhesive by simply dissolving the adhesive in a solvent, but lacks mentioning about a water-soluble adhesive (as in claims 7-8,17); deionized water for removing (as in claim 8).

However, *Wyland et al* teach (at col 8, lines 1-10; col 7, lines 54-67) forming a removable adhesive resin film on a substrate, wherein polyimide, alkali-soluble resin, or water-soluble resin are alternatively used for forming the adhesive resin film. *Weng* teaches (col 5, lines 34-37,27-51; and col 4, line 25 through col 5, line 51) the removable material for electronic device comprises a polymeric-base material and a water soluble adhesive, wherein removing the removable adhesive material is performed with deionized water (as a pure water).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the removable material Fjelstad by employing a water-soluble adhesive of resin and polyimide, as taught by Wyland and Weng. This is because substitution of art recognized equivalent removable materials, as alternative materials, is within the level of one of ordinary skill in the art, wherein water-soluble resin material or polyimide is highly adhesive to the terminals of the lead frames, wherein, by using water soluble resin/adhesive, removing the removable materials can be easily and conveniently performed with water, as further taught by Weng, and less expensive, wherein with the use of deionized water, as a high purity water, ion contamination of the device can be prevented and thereby improving reliability and quality.

3. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad (6,001,671), Landi (4,944,087) and Juskey et al (5,218,759), as applied to claims 1-2,5-6,16, 20-26,27 above, further taken with Roche et al (4,530,152).

The references including Fjelstad '671, Landi, and Juskey teach a method for forming a package for an electrical device as applied to claims 1-2,5-6,16,20-26,27 above, and fully incorporated herein. Fjelstad also teaches attaching the removable material is performed before

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one or more isolated conductive features 110' have been formed within the conductive material (Fig 2B), wherein attaching an encapsulant (140' in Fig 2D; 140 in Fig 1E) is performed before a singulation process to separate the package; and removing the removable material from the conductive features 110', 115', 110 and the encapsulant (Figs 1E-1F; col 4, line 66 through col 5; Fig 2F, col 5, lines 60-65; Fig 2E, col 5, lines 45-65). Furthermore, Fjelstad also teaches removing the removable material 100' of polymer material from the conductive features 110', the die attach pad 115', the electronic device 120', and the encapsulant 140' (Fig 2F, 2E, col 5, lines 60-65; 45-65). Landi teaches (at col 5, lines 28-35; col 7, lines 39-47; col 6 lines 14-50; Figs 5, step 1; col 5, lines 1-35; Figs 1-4; col 4, line 7-54) laminating and attaching a removable material comprising a soluble adhesive and a polyimide material to a surface of a conductive material, and thereafter removing the removable material comprising the soluble adhesive by dissolving the soluble adhesive with a solvent after molding to encapsulate the circuit pattern with an encapsulant. Juskey et al also teach (at Figs 1-3; col 2, lines 25 through col 3, line 59) employing a removable material 18 comprising a soluble adhesive 19 as a temporary support removable material for bonding and attaching to an electronic device 10; forming an encapsulant 30 thereon (Figs 2-3, col 3, lines 1-20), and thereafter removing the removable material from the feature either by peeling (col 3, lines 20+) or by dissolving or degrading the adhesive bonding with chemical materials that should not cause degradation of the molding compound (col 3, lines 40-46).

Re claim 28, the references including Fjelstad thus lack mentioning to remove the removable material after the singulation process.

However, Roche teaches removing the removable sacrificial material from the conductive features 2 and the encapsulant 5 (col 3, line 62 through col 4, line 25), wherein the removing the material step can be performed before or after the singulation process for separating the package (col 4, lines 20-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the removable material of Fjelstad either after a singulation process to separate the package or prior to a singulation process as alternatively taught by Roche. This is because removing the removable material either after or prior to the singulation process are alternative and art recognized equivalent processes for substitution in fabrication of

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the electronic device, and because of the desirability to expose a portion of the metal lead frame and conductive features for subsequent electrical connection, wherein by removing the removable material after singulation process, the removable material would still cover and thereby consequently protect the isolated conductive features and metal lead frame from being contaminated during singulation process.

(10) Response to Argument

(1) Rejection of claims 1-2, 5-6, 16, and 20-27 by using Fjelstad (6,001,671) taken with Landi (4,944,087) and Juskey et al (5,218,759).

Appellants remarked (at the Brief, bridging paragraph of pages 6-7) that

...In Fjelstad, portions of dielectric polymer sheet 100' are then removed...Fjelstad further discloses that if a wiring layer is **not** needed, **the entire sacrificial layer 100'** may be removed by chemically **dissolving** the sheet, See, e.g., Fjelstad, column 5, lines 60-65 (bold added)

In response, it is agreed with Appellants that Fjelstad expressly teaches (at column 5, lines 60-65) that

It should be noted that **if a wiring layer**, such as is described in this multichip embodiment, **is not** needed or desired, the **entire polymer sheet 100'** may simply **be removed by** chemically **dissolving** the sheet leaving the pads and the central conductive region exposed. (bold added)

Indeed, in the other alternative embodiments at Figures 1A-1G-1, 4A, 4B, and 3, and related text, Fjelstad teaches, after encapsulating, *removing the **entire** polymer sacrificial sheet layer **by dissolving***, if the wiring layer is **not** need. As shown in Figures 1G-1, 4A, 4B and 3, the structure of the electronic device is different from that of Figure 2E. Fjelstad alternatively teaches forming another electronic device at Figures 2A-2E by removing **portions** of the sacrificial removable polymer sheet 100' when the wiring layer is needed. Also, as shown at least in Figure 2A of Fjelstad, the sacrificial polymer sheet layer 100' is attached to the surface of the conductive material 101'.

*** Appellants then remarked (at the Brief, first paragraph of page 7) that

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...However, Fjelstad fails to disclose attaching a removable material to a surface of a conductive material, where the removable material comprise a soluble adhesive, and removing the removing the removable material from conductive features, die attach pad, and encapsulant by dissolving the soluble adhesive... Thus, in Fjelstad, the sacrificial layer must be removed by actually dissolving it, whereas in the invention as defined by independent claim 1... (originally underlined).

In response, this is noted and found totally unconvincing. The rejection is under 35 USC 103 for the combination of *Fjelstad taken with Landi and Juskey*. Thus, the rejection is not simply overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. In *Re Lyons* 150 USPQ 741 (CCPA 1966). Moreover, it is well settled that one can not show non-obviousness by attacking the references individually where, as here, the rejection is based on combinations of references. In *Re Keller*, 208 USPQ 871 (CCPA 1981); In *Re Young*, 159 USPQ 725 (CCPA 1968).

Herein, in the combined references, relevant portions of Landi are excerpted hereafter, at column 4, lines 20+ in that

...FIG. 5. Step 1 is to prepare a **laminate** of the flexible substrate to copper using appropriate **adhesive**...

at column 5, lines 1-35 of Landi in that:

...This step is followed by an operation to **remove** substrate 16 and **adhesive** 26... A solvent rinse is preferred. This **solvent** or solution will **dissolve** or decompose **adhesive 26**...

The adhesive can be LARC thermoplastic polyimide...which may be later removed...by a chemical agent, solvent...so as not to damage the molding material upon removal of the adhesive and film...

at column 6, lines 14-50 of Landi in that:

An important feature of the present invention results from the relationship of the polymeric materials used as substrate (I), flexible carrier (II), and the adhesive (III)...

The **adhesive** used..., but still it **must be removable** after molding **without damaging the substrate polymer**...Or else, if a chemical agent were used to remove III, said chemical agent **can not** also attack I...

In a preferred embodiment,...Next, a hot concentrated alkali (caustic) solution is used to chemically attack the LARC adhesive but which cannot attack the...material I...

and at column 7, lines 42-46 of Landi in that:

...the adhesive is removed by dissolving the adhesive layer with a solvent... (bold and underline added)

Thus, **Landi** prima facie clearly teaches (at Figure 5, step 1; column 5, lines 1-35; column 6 lines 14-50; column 2, lines 6-65; Figures 1-4; column 4, line 7-54) about employing a

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removable material comprising a soluble adhesive in order to easily laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material, wherein the removable material 16 comprises a polyimide material and a soluble adhesive (col 5, lines 12-35; col 6, lines 14-50; col 7, lines 38-51), wherein the removable material comprising the soluble adhesive is removed by dissolving the adhesive with a solvent after molding to encapsulate the circuit pattern with an encapsulant.

Additionally, *Juskey* also prima facie teach (at Figures 1-3; column 2, line 25 through column 3, line 59) employing a removable material 18 comprising a soluble adhesive 19 as a temporary support removable material for bonding and attaching to an electronic device 10; forming an encapsulant 30 thereon (Figures 2-3, column 3, lines 1-20), and thereafter removing the removable material from the feature either by peeling (column 3, lines 20+) or by dissolving or degrading the adhesive bonding with chemical materials that should not cause degradation of the molding compound (column 3, lines 40-46).

Indeed, relevant portions of *Juskey* are also excerpted hereafter, at column 2, in that

...The assembly 16 (comprising the semiconductor device wirebonded to the substrate) is then **attached** to a temporary substrate 18 by means of an **adhesive** 19. The temporary support substrate may be selected from a wide variety of materials...flexible film or metals...

and at column 3, from line 20 of *Juskey* in that

...The temporary support substrate 18 is then removed by **peeling it away** from the circuit carrying substrate to reveal the resulting structure shown in FIG. 4...**Other methods** of removing the temporary substrate, such as **dissolving or degrading the adhesive** bond with chemical materials may also be used, however, the selected chemicals should not cause degradation of the molding compound. (bold added)

Accordingly, the combined references of *Fjelstad taken with Landi and Juskey* prima facie teach attaching the removable material layer comprising a soluble adhesive to a layer of conductive material; and after encapsulant, removing the removable material by dissolving the soluble adhesive by using a solvent or solution, without damaging the removable material and the molding material. Landi and Juskey clearly teach removing the sacrificial removable layer by dissolving the soluble adhesive, without damaging the sacrificial removable material layer and without damaging the molding encapsulant compound, thereby actually dissolving the sacrificial layer is not necessarily carried out or needed to perform. In the combined references, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the

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time the invention was made to attach the removable material layer 100' to the film of conductive material 101' of *Fjelstad* by employing a removable material comprising a soluble adhesive for attaching to the conductive material, as taught by *Landi and Juskey*. This is because of the desirability to surely adhere the removable material to the conductive material, and to improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material. This is also because of art recognized alternative and equivalent for substitution with the desirability to simplify and easily facilitate the removal of the removable material comprising the soluble adhesive from the encapsulated device by simply dissolving the adhesive in a solvent.

*** Appellants remarked (last line of first paragraph of the Brief page 7) that
“...dissolving the soluble adhesive in, for example, hot water”.

In response, it is noted and found unconvincing. That limitation of “hot water” is not found in the claims. Claimed subject matter, not the specification, is the measure of invention. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In *Re Self*, 213 USPQ 1,5 (CCPA 1982); In *Re Priest*, 199 USPQ 11,15 (CCPA 1978).

It is noted that “water soluble adhesive” and “deionized water” are recited in claims 7,17 and claim 8, respectively. However, as already of record with respect to claims 7,17 and 8, *Wyland et al* prima facie teach (at col 8, lines 1-10; col 7, lines 54-67) forming a removable adhesive resin film on a substrate, wherein polyimide, alkali-soluble resin, or water-soluble resin are alternatively used for forming the adhesive resin film. *Weng* clearly teaches (col 5, lines 34-37,27-51; and col 4, line 25 through col 5, line 51) about employing the removable material comprising a polymeric-base material and a water soluble adhesive, wherein removing the removable adhesive material is performed with deionized water (as a pure water). Thus, the rejection is not overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. In *Re Lyons* 150 USPQ 741 (CCPA 1966).

*** Appellants further remarked (at the Brief, from first paragraph of page 8) that

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...However, if a wiring layer is needed, only portions of polymer sheet 100' are removed such that only pads 110' and central conductive region 115' are exposed. If a soluble adhesive were utilized to attach removable material 100' to conductive material 101' as suggested by Examiner, however, Appellant submits that it would not be possible to dissolve only portions of removable material 100' in a solution without undesirably dissolving (i.e. removing) all of the removable material... (underline added)

In response, this is noted and found totally unconvincing. First, Applicant merely argued about the other embodiment of Fjelstad in which if a wiring layer is needed, and then alleged that it would not be possible to dissolve only portions of removable material.

Appellant is however *silent* about the alternative embodiment of Fjelstad in which if the wiring layer is **NOT** needed (the embodiment from which the claims and the rejections are directed to), the **entire** sacrificial polymer sheet 100' can be removed by **dissolving** the polymer sheet (Fjelstad, column 5, lines 60-65). Second, the combined references including *Fjelstad taken with Landi and Juskey* prima facie teach **attaching** the removable material layer comprising a soluble adhesive to a layer of conductive material, and after encapsulant, removing the removable material by ***simply dissolving the soluble adhesive in a solvent***, without damaging the removable material and the molding material. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the removable material layer 100' to the film of conductive material 101' of *Fjelstad* by employing a removable material comprising a soluble adhesive for attaching to the conductive material, as taught by *Landi and Juskey*. This is because of the desirability to surely adhere the removable material to the conductive material, and to improve the adhesion in order to laminate and attach the removable material comprising the soluble adhesive to a surface of a conductive material. This is also because of art recognized alternative and equivalent for substitution with the desirability to simplify and easily facilitate the removal of the removable material comprising the soluble adhesive from the encapsulated device by simply dissolving the adhesive in a solvent.

*** Appellant remarked about Landi (at the Brief, pages 9-10) that

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The Examiner has cited...Landi specifically discloses...preparing a laminate of a flexible substrate to copper using an appropriate adhesive....Thus, in Landi, the adhesive, which can be polyimide...is removed...by using a chemical agent, solvent...

Thus, in Landi,...In contrast, removable material 100' disclosed in Fjelstad need to be sufficiently bonded to conductive layer 101' to enable a wiring layer subsequently formed from conductive layer 101' to remain attached to portions of removable material 100'... Thus, Appellant submits that Landi's method of using an adhesive to attach copper to a flexible substrate would not work in Fjelstad for removal of only portions of material 100'...

and similarly about Juskey at the Brief page 11 that

In contrast to Juskey, removable material 100' disclosed in Fjelstad needs to be sufficiently bonded to conductive layer 101'...Thus, Appellant submits that Juskey's method of using an adhesive to attach substrate 12 to temporary support substrate 18 would not work for removal of only portions of removable material, as disclosed in Fjelstad... (underline added)

In response, this is noted and found totally unconvincing. Again, Applicant merely argued about the other embodiment of Fjelstad in which if a wiring layer is needed, and then alleged submitted that it would not work if for removal of only portions of materials 100' in Fjelstad.

Appellant is however *silent* about the other alternative embodiment of Fjelstad in which if the wiring layer is **NOT** needed (the embodiment from which the claims and the rejections are directed to), the **entire** sacrificial polymer sheet 100' can be removed by **dissolving** the polymer sheet (Fjelstad, column 5, lines 60-65). The combined references including *Fjelstad taken with Landi and Juskey* prima facie teach **attaching** the removable material layer comprising a soluble adhesive to a layer of conductive material, and after encapsulant, removing the removable material by ***simply dissolving the soluble adhesive in a solvent***, without damaging the removable material and the molding material. Moreover, if the wiring layer is not needed or desired, there is no need to have a permanent bond to attach the conductive layer to the removable material comprising a soluble adhesive as in the combined references including Fjelstad, Landi and Juskey, since the sacrificial removable layer comprising the soluble adhesive must be necessarily removed by dissolving the soluble adhesive in a solvent, as taught by the references in order to expose the isolated conductive features for electrical connection.

Accordingly, for the above reasons it is believed the rejection should be sustained.

(2) Rejection of claims 7-8 and 17 by using Fjelstad taken with Landi and Juskey, and further of Wyland (6,111,199) and Weng et al (5,972,234).

Appellant remarked (at the Brief, line 3 of page 13, line 3 to page 15) that

...In **Wyland**, ring 322, which can include **an adhesive that can be, for example, a water-soluble resin composition**, can be dissolved in a solvent after wire bonding. See, e.g., Wyland, column 7, lines 48-67 and column 8, lines 1-3.

However, as discussed above, Fjelstad teaches away from attaching a removable material comprising a soluble adhesive to a conductive material and removing the removable material by dissolving the soluble adhesive, as disclosed in independent claim 1. Furthermore, moisture in the environment might cause...to unintentionally separate from a wiring layer when a wiring layer was utilized. Thus, Fjelstad also teaches away from utilizing a water soluble adhesive to attach the dielectric polymer to a conductive layer...

and at second paragraph of Brief page 14 to page 15 that

The Examiner has also cited **Weng** as disclosing a removable material for an electronic device comprising a polymeric-base material and a **water soluble adhesive**, wherein removing the removable adhesive is performed with **deionized water (as pure water)**...

However, as discussed above, Fjelstad teaches away from attaching a removable material comprising a soluble adhesive to a conductive material and removing the removable material by dissolving the soluble adhesive, as disclosed in independent claim 1. Furthermore,...moisture in the environment might cause the dielectric polymer sheet...to unintentionally separate from a wiring layer when a wiring layer was utilized. Thus, Fjelstad also teaches away from utilizing a water soluble adhesive to attach the dielectric polymer to a conductive... (bold & underline added)

In response, this is noted and found totally unconvincing. Again, Applicant merely argued about the other embodiment of Fjelstad in which if a wiring layer is needed or utilized in Fjelstad, and then simply alleged that it would teach away from utilizing a water soluble adhesive to attach the dielectric polymer to a conductive layer, since the moisture in the

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environment might cause the polymer sheet to unintentionally separate from the wiring layer in Fjelstad.

Appellant is however *silent* about the other alternative embodiment of Fjelstad in which if the wiring layer is **NOT** needed (the embodiment from which the claims and the rejections are directed to), the **entire** sacrificial polymer sheet 100' can be removed by **dissolving** the polymer sheet (Fjelstad, column 5, lines 60-65). The combined references including *Fjelstad taken with Landi and Juskey* prima facie teach **attaching** the removable material layer comprising a soluble adhesive to a layer of conductive material, and after encapsulant, removing the removable material by ***simply dissolving the soluble adhesive in a solvent***, without damaging the removable material and the molding material. When the wiring layer is not needed or desired, there is no need to have a permanent bond to attach the conductive layer to the removable material comprising a soluble adhesive, since the sacrificial removable layer comprising the soluble adhesive must be necessarily removed by dissolving the soluble adhesive in a solvent as taught by the references in order to expose the isolated conductive features for electrical connection. In the combination of references, Wyland and Weng prima facie further alternatively teach about using of water soluble adhesive, wherein removing of the removal of the water soluble adhesive can simply be performed by applying a water solvent, such as with a deionized water for removing the adhesive is further taught by Weng.

Indeed, relevant portion of Wyland at column 7, lines 65-67 are excerpted here in that:

The **adhesive** included in ring 322 is degradable, e.g. (1) by **dissolution in a solvent (such as water)** or (2) by crumbling into a powder when heated...Examples of one or more such **adhesive are (1) water soluble resin composition...** (bold added)

Thus, in the combination of references, Landi and Juskey expressly teach the desirability to dissolve the adhesive in a solvent without damaging the removable material and the molding compound. Using the water solvent for removing the water soluble adhesive as further taught by Wyland and Weng is within the level of one of ordinary skill in the art for these advantages, and because substitution of art recognized equivalent removable materials, as alternative materials, is within the level of one of ordinary skill in the art, wherein water-soluble resin material or polyimide is highly adhesive to the terminals of the lead frames, wherein, by using

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water soluble resin/adhesive, removing the removable materials can be easily and conveniently performed with water, as further taught by Weng, and less expensive, wherein with the use of deionized water, as a high purity water, ion contamination of the device can be prevented and thereby improving reliability and quality.

For the same reasons above with respect to independent claim 1 and as above, it is believe that the rejection should be sustained.

(3) Rejection of claim 28 (not claim 18 as corrected by the supplemental Brief page 16 filed March 04, 2008) by using Fjelstad, Landi and Juskey, and further of Roche (4,530,152).

*** Appellant remarked (at the Brief page 16) that

Independent claim 28 includes similar limitations as independent claim 1. Thus, for similar reasons as discussed above, independent claim 28 is also patentably distinguishable over Fjelstad, Landi, and Juskey. In addition to the limitations in independent claim 1, independent claim 28 specifies removing the removable material from conductive features and encapsulant after the singulation process is performed to separate the package. In contrast, Fjelstad discloses dicing the packages into either individual packages or multichip packages after portions of polymer sheet 100' are removed to expose pads 110' and central conductive region 115'. See, e.g., Fjelstad, column 5, lines 46-51...

In response, it is noted and found totally unconvincing. Rejection of claim 1 by using *Fjelstad, Landi and Juskey* is still outstanding for the prima facie reasons as discussed above in rejecting of claim 1. The reasons are also applied the same and repeated herein for rejecting of claim 28 by using *Fjelstad, Landi and Juskey*, and further of *Roche* as discussed below.

Relevant portion of Roche at column 4, lines 20-25 are excerpted hereafter in that:

....Each component is separated from the others after encapsulation with and hardening of the resin, by sawing or other cutting technique, and **either before or after removal of the temporary substrate** (underline and bold added)

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Thus, in the combination of references, Roche prima facie teaches removing the removable sacrificial material from the conductive features 2 and the encapsulant 5 (col 3, line 62 through col 4, line 25), wherein the removing the material step can be performed before or after the singulation process for separating the package (col 4, lines 20-25). The rejection is not overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. In Re Lyons 150 USPQ 741 (CCPA 1966).

*** Appellant alleged (at first and second paragraphs of the Brief page 17) that

.....Roche fails to disclose attaching a removable material comprising a soluble adhesive to a surface of a conductive material, as specified in independent claim 28.

Additionally, Roche states the melting of the alloy layer...Thus, Roche teaches away from attaching a removable material comprising a soluble adhesive....

In response, this is noted and found totally unconvincing. The combined references including *Fjelstad*, *Landi* and *Juskey* already clearly teach the steps and the desirability to attach a removable material comprising a soluble adhesive to a conductive material, and after encapsulating, removing the removable material by dissolving the soluble adhesive in a solvent. Thus, the rejection is not overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. In Re Lyons 150 USPQ 741 (CCPA 1966).

*** Appellant alleged (at first and second paragraphs of the Brief page 18) that

.....As is known by one of ordinary skill in the art, a masking step is required to selectively remove portions of dielectric polymer sheet 100'. Appellant respectfully submits that performing the required masking step on the wafer is significantly easier and more cost effective compared to masking each individual package, as is required if portions of dielectric polymer sheet 100' in *Fjelstad* are removed after the packages have been separated from the wafer.

Also, Appellant respectfully submits that a person of ordinary skill in the art would not have seen a benefit to removing portions of the dielectric polymer sheet after dicing the wafer in *Fjelstad* that would offset the advantages realized by removing portions of the dielectric polymer sheet from the package before dicing the wafer, as discussed above.... (underline added)

In response, this is noted and found totally unconvincing. Again, Appellant merely argued about the other embodiment of Fjelstad in which if a wiring layer is needed and in that only portions of the sacrificial polymer sheet are removed in Fjelstad. Applicant then simply alleged that it would not have seen a benefit to removing portions of the polymer sheet after dicing.

Appellant is however *silent* about the other alternative embodiment of Fjelstad in which if the wiring layer is **NOT** needed (the embodiment from which the claims and the rejections are directed to), the **entire** sacrificial polymer sheet 100' can **be removed by dissolving** the polymer sheet (Fjelstad, column 5, lines 60-65). Masking step is NOT required in this embodiment if the wiring layer is not needed, since the entire sacrificial removable layer must be necessarily removed. Furthermore, the combined references including *Fjelstad taken with Landi and Juskey* prima facie teach **attaching** the removable material layer comprising a soluble adhesive to a layer of conductive material, and after encapsulant, removing the removable material by ***simply dissolving the soluble adhesive in a solvent***.

Additionally, in the combination of references, *Roche* prima facie further teaches the desirability, the advantages, and the obviousness of singulating to separate the package either before or after removal of the temporary substrate. This is because removing the removable material either after or prior to the singulation process are alternative and art recognized equivalent processes for substitution in fabrication of the electronic device, and because of the desirability to expose a portion of the metal lead frame and conductive features for subsequent electrical connection, wherein by removing the removable material after singulation process, the removable material would still cover and thereby consequently protect the isolated conductive features and metal lead frame from being contaminated during singulation process.

In conclusion, the combined references clearly teach enough processing limitations to suggest that one skilled in this semiconductor art could reasonably expect success of claimed process. As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor. See *In re Beattie*, 974 F.2d 1309, 24 USPQ2d 1040 (Fed.

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Cir. 1992); In re Kronig, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976) and In re Wilder, 429 F.2d 447, 166 USPQ 545 (CCPA 1970).

Also, it is well settled that motivation or advantage may be different than that of applicant while still supporting a conclusion of obviousness. In Re Wiseman 201 USPQ 658 (CCPA 1979); Ex Parte Obiaya 227 USPQ 58 (Bd. of App. 1985).

For the above reasons it is believed that the rejection should be sustained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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